

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

**IMAGES ARE BEST AVAILABLE COPY.**

As rescanning documents *will not* correct images,  
please do not report the images to the  
**Image Problem Mailbox.**

430 Rec'd PCT/PTO 28 JAN 2000

WO 99/06982

PCT/AT98/00155

- 5 Learning system and method of learning learning contents as well as a program logic of a learning program

The invention concerns a learning system for learning learning contents. The invention further concerns a method of learning learning contents and a program logic of a learning program.

A learning system in which learning contents are displayed on a display screen is known for example from US patent specification No 5 147 205.

The principle applies in regard to any learning that a human being normally learns easily and well something in which he is really interested. If however something does not interest a human being, then he learns it only reluctantly and generally very slowly and only in such a way that he does not really know it well and he also quickly forgets it again. Nowadays in regard to learning in a school context there are some activities such as for example spelling exercises, learning vocabulary, learning dates in history or learning formulae in chemistry, which many people do not like and which they find tedious and for which it is therefore probably difficult to arouse interest on the part of such people.

The object of the invention is to provide a learning system and also a method of learning and a program logic of a learning system, whereby the learning of learning contents which arouse little interest is made easier.

In accordance with the invention that is achieved by a learning system having the features of claim 1 and by a method having the features of claim 4 and by a program logic having the features of claim 19.

In that respect the invention is based on the realization that the brain of a human being, if he looks at something which is of interest to

him, is opened up for the receipt of items of information. If at the same time something which is not interesting to him is also brought into play, that also penetrates well into the brain which is switched into a receiving mode, and it is therefore learnt more easily.

5       Desirably the learning contents are played into or introduced into the visual presentation in small portions, wherein the individual introductions are effected at spacings from each other in respect of time and the introduction time of a learning content is substantially shorter than the time interval between two successive introductions of learning  
10      contents. For example, the introduction of the learning content can be into a computer game. For that purpose, the learning content is called up out of a learning material memory and the game program is briefly interrupted for introducing the learning content. After the interruption the game program is continued again until the next learning content is  
15      introduced. In that situation, because of the short length of the introductions of learning contents which can possibly be below the perception threshold, the interruptions in the game program are so short that playing of the game is not adversely affected. In that case, the learning content can be presented only during the interruption in the  
20      game or also while the game is continuing, if the game permits that.

Further advantages and details of the invention are described hereinafter with reference to the accompanying drawing in which:

Figure 1 is a diagrammatic view of a learning system according to the invention,

25      Figure 2 is a further diagrammatic view of a learning system according to the invention, showing a learning program which is subdivided into various modules,

Figure 3 shows a flow chart of a learning content display module,

Figure 4 shows a flow chart of the checking program module, and

Figure 5 shows a flow chart of another embodiment of a learning program with a learning program module which is interwoven with the computer game program module.

Referring to Figure 1, diagrammatically illustrated therein is a learning system according to the invention having means 21 which cause a visual presentation such as a computer game, a television film or a video game to run on a display screen 20. The visual presentation can be influenced by way of an input device 28 which besides a keyboard can also include a mouse and a joystick, and by way of means 24 for controlling the learning system. In that way it is possible for example to select which visual presentation is to run, and given presetting values in respect of the visual presentation can be inputted. If the nature of the visual presentation permits it, in that way the running of the presentation can also be interactively influenced.

The learning contents to be learnt are stored in a learning material memory 26 and are called up out of same by means 25. Those called-up learning contents are played into or introduced into the visual presentation running on the display screen 20, by means 23. Preferably, while a learning content is being played on the display screen 20, running of the visual presentation is interrupted by means 22. Various modes of displaying the learning contents in a region of the visual presentation are described hereinafter with reference to Figure 2.

The learning system can be controlled in various ways by way of the input device 28 and the means 24. It is possible to alter the intervals between the individual introductions of a learning content by the means 23 and the duration of the display of a learning content on the display screen 20. It is possible to input which learning contents are called up out of the learning material memory by the means 25, and at what frequency. The learning contents in the learning material memory 26 can be processed and further learning contents can be introduced into the learning material memory 26 from a further memory 27, for example a

hard disk drive or an interchangeable data carrier drive. The learning contents can also be called up from the learning material memory 26 in order to check the learning success.

The learning system diagrammatically illustrated in Figure 2 shows  
5 a learning program 1 which runs on a commercially available PC and communicates with various hardware components of the PC. A plurality of such hardware components which are of importance for the learning system are shown in Figure 2. They are an input device 2 in the form of a keyboard and/or mouse, a display screen 3, a permanent memory in the  
10 form of a hard disk drive 4, a further drive 5 for interchangeable media such as floppy disks or CD-ROMs. A learning material memory 6 is disposed in the main memory of the computer, while a part of that learning material memory can be taken out of store onto the hard disk drive 4 or the data carrier fitted into the further drive 5.

15 The learning program 1 includes computer game program module 7, a learning content display module 8, a checking module 9, an editor program module 10, an input control module 11 and a control program 12 into which the specified program modules are embedded and which provides a graphic user interface on the display screen 3 for the input of  
20 parameters and for selection of one of the various program procedures.

The computer game program module 7 causes a computer game (which can be selected from a number of computer games) to run as a visual presentation on the display screen 3. The computer game can be operated by way of the input device 2. At given intervals which can be set  
25 by way of the graphic user interface of the control program, the learning content display module 8 or the control program 12 interrupts the running of the computer game by the computer game program module 7 and the learning content display module 8 introduces a learning content which is loaded from the learning material memory 6, into the visual presentation  
30 which is shown on the display screen (and which is momentarily stopped). The learning content introduction period can be selected by way of the

graphic user interface of the control program 12 and is preferably in a range which is shorter than 1 second and which is preferably shorter than 0.2 second and - if desired - can even be shorter than the conscious perception threshold for the learning content. After the learning content 5 introduction period has expired the computer game program module 7 continues the computer game until the next interruption takes place for the purposes of introducing a portion of learning content. The time interval between two successive operations of introducing learning contents can in turn be selected by way of the graphic user interface of 10 the control program 12 and is preferably substantially longer than the introduction period of an individual portion of learning content in order not to have an adverse effect on running of the computer game, in order not to rob the computer game of its character as a game and in order to permit psychological processing of the individual learning contents by the 15 user. In the case of game programs which are suitable for that purpose, the displayed learning content can also still persist in the game as it continues.

Introduction of the learning content into the visual presentation displayed on the display screen can be implemented into a stationary area 20 which is always at the same location or which appears at respective various positions which are adapted to what is happening on the display screen, or into a moving area which follows a given event of the computer game. For that purpose the computer game program module can be briefly interrupted and caused to run again a plurality of times in 25 succession by the learning content display module 8, in which case upon each interruption in the computer game program module by the learning content display module the area for display of the learning content is displayed at a somewhat displaced location on the display screen so that overall the impression afforded is that of a moving area. The area can be 30 visible due to a frame and a filling color and in that case can be steady or blinking or invisible - the nature thereof can be selected by the user. The

learning content itself can be displayed in the area continuously (steadily) or in a blinking or flashing mode, in which respect "blinking" means repeated brief display and "flashing" means single very brief display. The flashing time of the learning content can be so short that it is beneath the perception threshold. The learning content can also be introduced in pixel-wise or letter-wise manner. The appearance of the introduced learning contents can be graphically configured by the user with the editor program module 10.

For the purposes of learning a foreign language, the learning contents are one or more words of that foreign language and they are introduced in the form of labelling on or inscriptions applied to objects present in the computer game. In order to achieve interactivity, those learning contents can also be displayed when the respective objects are clicked with the mouse pointer. In the case of learning systems of that kind, in the simplest embodiment, there is no need either for a specific learning material memory or an interruption in the game, because labelling and also display when clicking on objects can be parts of the game. If the necessary hardware is present, the learning contents can also be introduced acoustically in the form of speech.

Figure 3 shows a flow chart of an embodiment of a learning content display module, more specifically in a variant when the computer system used and the computer language employed do not permit time sharing. After the beginning of the program the system time is loaded. In the first running of the program after the beginning of a new learning session, the learning content counter is set to zero and the program branches to the command "increment learning content counter by 1". Subsequently the next learning content is loaded from the learning material memory 6 into a preparation memory or buffer (not shown in Figure 2) which is also implemented in the main memory of the computer. The repetition number associated with that learning content is ascertained from the learning card file described hereinafter and the repetition counter is set to

1. In the first running of the program the spot counter which specifies how many spots were previously displayed on the display screen is also set to zero and the program therefore branches to the command "increment spot counter by 1". The learning content in the buffer is now  
5 displayed on the display screen. The present system time is stored in the variable "time of the last spot". If the repetition counter is less than the repetition number associated with the learning content, the repetition counter is incremented by 1 and the program is left, otherwise the learning content counter is incremented by 1 and the next learning  
10 content is fetched from the learning material memory into the buffer, in which case the associated repetition number is ascertained from the learning card file. In this case moreover the repetition counter is set to 1 and as the spot counter is now greater than zero the program is left. On the next running of the program the system time is again loaded. As the  
15 learning content counter is now greater than zero, the variable "time since the last spot" is ascertained, which is determined from the system time less the time of the last spot. If the time since the last spot is less than the spot spacing which is inputted by way of the graphic user interface of the control program, the program is left, otherwise the spot counter is  
20 incremented by 1, the learning content is played onto the display screen from the buffer and the variable "time of the last spot" is set to the system time. Depending on whether the repetition counter is less than the repetition number associated with the present learning content, the repetition counter is incremented by 1 and the program is left or the  
25 learning content counter is incremented by 1 and the next learning content is fetched from the learning material memory into the buffer, in which case the associated repetition number is ascertained, the repetition counter is set to 1 and the program is left.

The commands relating to time control do not apply in regard to  
30 time-sharing versions.

By way of the checking program module 9 it is possible to check whether the learning person has correctly received the learning contents. For that purpose the learning contents stored in the learning material memory 6 are desirably characterised as being stored in various learning 5 card file compartments or boxes. If the learning content which is called up by the checking program module is known, the learning content is further put into a learning card file compartment or box with a higher degree of knowledge, in which case the learning contents of the learning card file box with the highest degree of knowledge are no longer put onto 10 the display screen by the learning content display module. In addition a given repetition number can be linked to each learning card file box. This is the number as to how often a given learning content is displayed on the display screen in succession (or at what average frequency).

Figure 4 shows a flow chart of the checking program module. After 15 the start of the program the form of presentation of the learning content and the form of the answer can be selected. In addition the number of fresh attempts in the case of a wrong answer can be inputted. Finally the learning card file compartment or box of the learning card file, which is to be checked, is also selected. If the program is not broken off or 20 terminated, a learning content is fetched from the learning material memory and presented in the selected form on the display screen. The repetition counter is set to 1. After input of the answer, the answer is monitored by the program. If the answer is wrong, further progress of the program depends on whether the repetition counter corresponds to 25 the repetition number. If that is not the case, the repetition counter is incremented by 1 and the answer can be inputted once again. If on the other hand the repetition counter is equal to the repetition number, the correct answer is displayed and, if the learning content is not already in the first compartment or box, the learning content is moved further 30 forwardly in the learning card file by one or more compartments or boxes - the associated algorithm can be established by the user - and, if the

DE 30 29 500 000

program is not terminated, the next learning content is fetched from the learning material memory. If the answer was correct, the further procedure with the program depends on whether the learning content was already in the last active compartment or box. If that was the case, the 5 learning content is stored in the latent memory which corresponds to the box with the highest degree of knowledge and from which no further introduction of the learning content into the computer game is implemented. Otherwise the learning content is arranged in the learning card file rearwardly by one box, that is to say it is put into the box with 10 the next higher degree of knowledge.

By way of the editor program module 10, it is possible for new learning contents to be inputted into the learning material memory or introduced from the data carrier in the hard disk drive 4 or the interchangeable data carrier drive 5 or for learning contents already 15 present in the learning material memory to be processed. It also enables graphic configuring of the learning contents. The inputs can be checked for correctness by way of the input checking module 11.

Figure 5 shows a part of the flow chart of a further embodiment of the learning program. In this case, as set forth hereinafter, a learning 20 content display module is interwoven with a computer game program. After a starting dialog in which for example the area of knowledge to be learnt and the computer game to be used is interrogated, the procedure involves querying whether the learning contents in the learning material memory are to be processed and, if that is the case, the procedure 25 returns to the starting dialog after processing of the learning material memory (by means of an editor program module). The procedure subsequently queries whether a knowledge checking operation is to be implemented. In that case, after implementation of the knowledge 30 checking operation (with a checking program module), the procedure reverts to the starting dialog. Finally the procedure queries whether the

game is to be begun and, in a negative case, it reverts to the starting dialog while in the positive case the game is initialized.

Subsequently the program of the computer game runs, in which case the command "go to the subroutine learning content display(= spot)"  
5 is distributed by way of the commands of the game program in such a way  
that this subroutine is called up at a spacing of approximately one second  
in each case. Another option would provide that the subroutine learning  
content display is called up by a time sharing command if the  
programming language of the computer game has such a command  
10 available.

Instead of a computer game, it would also be possible to play on  
the display screen other visual presentations such as for example a  
television film or a video game. Introduction of the learning contents as  
well as checking and editing of the learning contents can be effected in  
15 that case in a similar manner by way of suitable hardware. An apparatus  
for introducing a subliminal message into a normal television picture is  
known for example from WO 94/26063.

DE 601 026 000